Before the
DEPARTMENT OF COMMERCE
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION
Washington, D.C. 20230

In the Matter of	)	
	)	
Telecommunications Assessment of the Arctic Region	)	Docket No. 140925800-4800-01
	)	

COMMENTS OF GENERAL COMMUNICATION, INC.

General Communication, Inc. ("GCI") hereby submits comments in response to the National Telecommunications and Information Administration's ("NTIA's") Notice of Inquiry ("NOI") in the above-referenced proceeding.[1]

I. GCI Is the Leading Provider of Communications Services and Infrastructure in the U.S. Arctic

As the leading telecommunications provider in the United States Arctic, GCI has made an unparalleled commitment to the region, upon which we continually build, expand, and innovate. Founded in 1979 as a competitive long distance provider, GCI has grown through investment and technological innovation to become the largest communications provider in Alaska, offering an incredibly wide range of communications services, including mobile voice and data, residential and business Internet, terrestrial and satellite backhaul, cable television, broadcast television, and telemedicine and distance learning services. We have consistently proven our ability to adapt state-of-the-art technology to bring new and dramatically improved communications services to the Arctic. From substantial advancements in landline voice services, to mobile voice services, and now to fixed and mobile broadband, GCI has consistently envisioned and accomplished major infrastructure investments to deliver last-mile services to the region, relying on a variety of middle-mile technologies, including satellite, microwave, and fiber.

GCI has invested well over $2 billion in capital in Alaska since 1979, almost $1.4 billion of that in the last decade. As a result of this investment, GCI currently serves over 100 locations above the Arctic boundary as defined by the Arctic Research and Policy Act ("ARPA"),[2] many of which are north of the Arctic Circle. GCI's investment, combined with universal service support, enables Arctic residents to connect with family and friends, to engage in civic activity, to participate in the broader economy, and even more vitally, to receive – and provide for –

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[1] Dept. of Commerce, NTIA, *Telecommunications Assessment in the Arctic Region*, Notice of Inquiry, 79 Fed. Reg. 59746 (Oct. 3, 2014) ("NOI").

[2] *See* Attachment 1 (showing Arctic boundary as defined by ARPA and GCI's locations).

emergency response, and to receive basic healthcare and educational services which would otherwise be unavailable in their communities. GCI's existing network infrastructure also is a springboard from which we will make additional investments in the Arctic.

II. Unique Challenges of Serving the Arctic

Notwithstanding these substantial investments, much work remains to bring advanced communications services, including Internet access, to all Arctic residents and businesses. Robust communications services are critical to full participation in the modern economy and help bind individuals together socially and culturally. In light of the significant challenges of providing communications services in the Arctic, GCI appreciates that NTIA is exploring how new federal, state, and international public-private partnerships can benefit the region and the Nation, among other innovative ideas, for expanding communications service in this region. We look forward to actively engaging with NTIA and other stakeholders in this proceeding as it moves forward.

The Arctic lacks much of the basic infrastructure vital to telecommunications deployment, such as a road system or an intertied power grid. Moreover, the small residential populations in much of the Arctic cannot, by themselves, sustain demand for telecommunications services sufficient for the construction, operation, maintenance, and upgrade of networks. As a result, private providers like GCI routinely need to find creative deployment solutions, working in partnership with public programs to create a business case for sustainable network investment and service offerings where none exists independently. GCI's success in bringing new communications infrastructure and services to unserved and underserved populations hundreds of miles from the nearest city is a testament to the effectiveness of leveraging public or universal service support to raise and drive private investment capital to these remote areas.

Alaska's overall population density is the lowest in the nation – 1.2 persons per square mile,[3] compared to 103.8 in the Lower 48.[4] Densities in the Arctic are substantially lower still. For example, the North Slope Borough comprises a total land area of 88,695 square miles and is home to only 9,686 residents – just 0.1 person per square mile, or one-thousandth of the overall density of the Lower 48.[5] Many Arctic communities are extremely tiny, with residents numbering in the tens to hundreds. Indeed, some of the communities NTIA specifically asked about, such as Umiat, are better described as mining camps with a rotating crew of seasonal workers than a community with permanent residents.[6]

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[3] *See* U.S. Census Bureau, *Statistical Abstract of the United States: 2012*, Table 14. State Population—Rank, Percent Change, and Population Density: 1980 to 2010, *at* http://www.census.gov/compendia/statab/2012/tables/12s0014.pdf (last visited Dec. 2, 2014).

[4] *See* United States Census Bureau, Population Density for States and Puerto Rico, July 1, 2009, *at* http://www.census.gov/popest/gallery/maps/popdens-2009.html (last visited January 17, 2012).

[5] *See* United States Census Bureau, State & County QuickFacts, North Slope Borough, Alaska, *at* http://quickfacts.census.gov/qfd/states/02/02185.html (last visited Dec. 2, 2014).

[6] *See, e.g.*, Ukpeaġvik Iñupiat Corporation, *Umiat Camp and Airfield, Alaska* (last visited Nov. 26, 2014) (stating that Umiat Camp is closed for the rest of the summer); Linc Energy, *Exploring Umiat*,

Most Arctic communities are accessible only by airplane, boat, or snow machine. In these areas unconnected by roads, there is no extensive power grid and communities instead typically generate their own power, primarily through the use of diesel generators, often costing up to $10 per gallon for fuel.[7] As a result, power in these isolated areas can be extremely expensive. Many of these rural communities pay more than 50 cents per kWh,[8] more than five times the national average for commercial retail electricity, with some paying between 60 and 90 cents per kWh for residential service.[9] These realities impact communications infrastructure. For some middle-mile facilities that are not close to any established communities, GCI must install its own diesel generators and fly in diesel fuel twice per year, requiring 18 helicopter trips per refueling.

Moreover, the distances involved are immense. GCI offers its existing mobile voice and data, residential and business Internet, and other services over a service footprint that would stretch from Michigan to Mexico and from the coast of Southern California to the coast of Northern Florida. Constructing telecommunications facilities in challenging terrain over such distances to deliver services to a relatively small number of people poses unique economic, logistic, and operational challenges.

Arctic weather can be unrelentingly harsh, and the ecosystem is in some ways fragile and protected by numerous federal and state laws that limit human activity, including the Alaska National Interest Lands Conservation Act, the National Wildlife Refuge System Administration Act, The National Wildlife Refuge System Improvement Act of 1997, the Wilderness Act, the Wild and Scenic Rivers Act, the Marine Mammals Protection Act, and the Arctic Refuge Comprehensive Conservation Plan. To the extent these laws would allow access in the first place, the federal and state permitting process for infrastructure projects on public lands as currently implemented creates costly and time-consuming redundancies, raising costs, creating unpredictability, and discouraging investment.

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http://lincenergyumiat.com/ (last visited Nov. 26, 2014) (describing the construction and maintenance of a 150 person camp at Umiat for the 2012-13 winter oil drilling season).

7 *See* Will Swagel, *Lowering the Cost of Rural Energy, Investments in Sustainability Save Millions*, Alaska Business Monthly, (Sept. 3, 2014), *at* http://www.akbizmag.com/Alaska-Business-Monthly/September-2014/Lowering-the-Cost-of-Rural-Energy/. Recently, utilities have begun adding wind turbines to the diesel systems, but these have generally slowed price increases rather than providing price reductions. There also are a small number of communities in rural Alaska that use hydroelectric or other renewable resources, but they are atypical.

8 *See* Alaska Village Electric Cooperative, *Table of Small Commercial Rates*, (effective as of Oct. 4, 2013) *at* http://www.avec.org/downloads/Small%20Commercial%20Rates.pdf *and* http://avec.securesites.net/customer-service.php (*see* Table of Small Commercial Rates).

9 *See Average Retail Price of Electricity to Ultimate Customers by End-Use Sector, by State, Year-to-Date through September 2014 and 2013*, Table 5.3, U.S. Energy Information Administration (last visited Sept. 18, 2014), *at* http://www.eia.gov/electricity/data.cfm#sales (under Sales (consumption), revenue, prices and customers).

III. GCI Utilizes All Available Technologies to Serve Arctic Residents and Businesses

GCI has proven time and again that it is willing and able to innovate and expand modern communications services in the Arctic. By way of illustration, it is well documented that the communications world is going mobile. GCI and its wireless affiliate, The Alaska Wireless Network, LLC ("AWN"), have done more than any other entity to deploy mobile wireless service in the Arctic.[10] AWN's Arctic mobile broadband network provides 4G services to well over 1,500 square miles of territory in and around Prudhoe Bay, and 2G services beyond that and in a number of other communities above the Arctic Circle, including some of the most remote. The expansion of mobile wireless service in the Arctic improves the lives of Artic residents and businesses in countless ways, including through emergency response. As just two of many examples, GCI's mobile wireless services helped a resident whose snow machine broke down miles from his Alaska Native village, allowing him to phone for help rather than risking the long hike back home in subzero temperatures, and allowed a woman who had survived a devastating plane crash to reach rescuers and guide them to the wreckage and aid injured survivors.[11]

GCI backhauls its wireless and other telecommunications traffic in the Arctic utilizing all available technologies – fiber, microwave, and satellite – as appropriate and feasible for each specific location.[12] For example, GCI's 800-mile fiber optic cable that follows the TransAlaska pipeline carries wireless and wireline telecommunications from the major energy producing region of Alaska to the lower 48 states.

While fiber is often the technology of choice for core networks or dense urban environments, building fiber to all, or even most, Artic locations currently is logistically, technologically, and economically impractical. Long fiber runs across Arctic tundra would need to be protected against damage caused by the complex and changing structure of permafrost, which can range in thickness from a single meter to many hundreds of meters thick. Uneven freezing and thawing at or near the surface can result in dramatic changes to landforms, such as

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[10] In 2012, GCI and the wireless affiliates of Alaska Communications Systems Group, Inc. ("ACS") each contributed their wireless assets to AWN, including all of their cell sites and tower infrastructure. AWN now provides wholesale services to both ACS Wireless and GCI, and both companies have access to AWN facilities and services, on an equal and non-discriminatory basis. This innovative infrastructure sharing arrangement minimizes duplicative infrastructure, investment, and operational costs, while providing GCI and ACS Wireless access to approximately twice as much spectrum as each held individually. *See Applications of GCI Communication Corp., ACS Wireless License Sub, Inc., ACS of Anchorage License Sub, Inc., and Unicom, Inc. for Consent To Assign Licenses to The Alaska Wireless Network, LLC*, WT Docket No. 12-187, WC Docket No. 09-197, Memorandum Opinion and Order and Declaratory Ruling (2013) (approving license transfer).

[11] *See* AP – The Big Story, *Mother on Crashed Plane Led Searchers to Wreckage* (Nov. 13, 2013), *at* http://bigstory.ap.org/article/troopers-plane-crash-w-alaska-10-aboard.

[12] Depending on the service area characteristics, local need, and cost, any one of these technologies may be utilized to deliver an acceptable level of service. *See* Alaska State Broadband Task Force, *A Blueprint for Alaska's Broadband Future*, at 9 (Oct. 2014) ("*Broadband Task Force Report*") (setting forth guiding principles), *at* http://www.alaska.edu/files/oit/bbtaskforce/2013-08-AK-Broadband-Task-Force-Report%7CA-Blueprint-for-Alaska%27s-Broadband-Future.pdf (last visited Nov. 26, 2014).

ice wedges (*i.e.*, growing cracks in the ground) and pingos (*i.e.*, small hills that arise quickly due to subsurface pressures), which could damage communications equipment.[13] And a warming Arctic climate may increase these risks over the lifespan of fiber optic cable in ways that are difficult to predict. Moreover, although the average Arctic sea ice extent is declining, ice scour, subsea permafrost, and other climate-related challenges continue to be significant impediments to the deployment of submarine fiber optic cable off the North Slope that otherwise might connect the communities near the Arctic Ocean. Hydrographic research suggests that the potential for increased breakup of multiyear sea ice and expected severe weather conditions might actually increase the severity and unpredictability of ice scour, the avoidance of which might require extremely expensive directional boring and deep burial for protection of undersea cable.

Even assuming these obstacles could be overcome, a provider seeking to deploy fiber would need solid plans in place to find damaged sections of cable and make repairs in the absence of roads during all seasons of the year – each of which poses unique challenges – while complying with all applicable permitting processes, and having made back-up plans to prepare for the unexpected. For undersea cable, if ice scour or other conditions causes a fiber optic cable to break, repairs could only be made during ice-free periods, meaning that outages could last for months. None of which is to say that fiber has no place in the Arctic. Indeed, as mentioned above, GCI has been successfully operating long-haul fiber in the Arctic for more than a decade. Nevertheless, investment in long-haul fiber facilities, while a laudable goal, is a significant undertaking appropriate only after extensive due diligence and planning.

GCI also relies on satellite to backhaul its local wireline and wireless voice and data traffic. Satellite technology has intrinsic benefits in certain contexts and applications, such as providing service in locations that are far from population centers. Improvements in satellite technology have increased bandwidth potentials, strengthening the viability of this communications option for multiple purposes. Techniques such as spoofing and local caching can accelerate throughput of TCP/IP traffic and help mitigate the approximately 600 ms latency inherent in geostationary orbit ("GEO") satellite networks.[14] Remotely hosting content Arctic businesses (or residents) want to make available online where storage and bandwidth are plentiful and relatively inexpensive further enables Arctic businesses to have a significant high-quality online presence despite their geographic location. Smart network design and operation therefore can significantly lower the barriers of space and time, making satellite an excellent

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[13] U.S. Fish & Wildlife Service, *Ice Wedges, Polygons, and Pingos*, http://www.fws.gov/refuge/arctic/permcycle.html (last visited Nov. 26, 2014) (describing the process by which the permafrost cycles through these changes); National Snow & Ice Data Center, *All About Frozen Ground – How Does Frozen Ground Affect Land?*, https://nsidc.org/cryosphere/frozenground/how_fg_affects_land.html (last visited Nov. 26, 2014) (describing how freezing and thawing in the Arctic can change the shape of the land).

[14] Spoofing, also known as TCP acceleration, is a technique in which network equipment acknowledges receipt of packets before transmission over the satellite link to prevent TCP's congestion control algorithms from slowing delivery of packets from the point of origin. Caching is temporary storage of data to improve network efficiency. *See, e.g.*, Cisco, *Cisco Accelerated Internet over Satellite Solution, at* http://www.cisco.com/c/en/us/products/collateral/routers/2800-series-integrated-services-routers-isr/solution_overview_c07-525404.html (last visited Dec. 2, 2014).

middle-mile technology choice for many applications until sufficient demand justifies additional investments in terrestrial options. Nevertheless, in addition to enormous replacement costs, bandwidth constraints remain a limitation, and it is not possible to mitigate every effect of latency, making satellite a challenging middle-mile platform for certain modern applications such as highly latency-sensitive applications or videoconferencing.

As a result, in western Alaska, GCI is deploying microwave technology to innovate terrestrial middle-mile broadband services in Alaska by building the TERRA network. Initiated in 2011, TERRA now delivers terrestrial (*i.e.*, non-satellite) broadband services to more than 70 communities, bringing the benefits of enhanced economic opportunity, public participation, and improvements to health, education, public safety and government services. TERRA utilizes fiber extensions where appropriate and microwave repeaters to connect parts of Alaska previously dependent on satellite middle-mile to the fiber backbone at true, low-latency broadband speeds for the first time. In 2012, GCI turned up the first phase of TERRA to connect Southwest Alaska to the fiber backbone in Anchorage. Last year, GCI extended the service in Nome, and will turn up in Kotzebue, north of the Arctic Circle, by the end of 2014. TERRA has brought true broadband to parts of Alaska where it was unthinkable only a few years ago.

GCI built the TERRA network by leveraging a competitively bid loan/grant secured through the American Recovery and Reinvestment Act of 2009, as well as a smaller grant through the State of Alaska, to support GCI's own capital investment. GCI has funded the $206 million in project costs to date with $156 million of at-risk capital on top of $50 million in public grants. While GCI has borne the majority (76%) of the investment risk, TERRA would not have been realized without public support. We continue to look for ways, including potential public/private partnerships, to expand the TERRA network and to use new or different technologies to expand our Arctic communications networks.

IV. Environmental Changes Present New Opportunities and New Challenges

GCI understands that environmental changes in the Arctic are creating new opportunities as well as new challenges. For example, as described in the *National Strategy for the Arctic Region*, diminishing sea ice has made portions of the Arctic Ocean more navigable, thereby "increasing interest in the viability of the Northern Sea Route and other potential routes, including the Northwest Passage, as well as in development of Arctic resources," including oil and gas deposits and valuable mineral resources.[15] These factors, among others, are likely to produce increased human activity in the Arctic, which increases the need and demand for modern communications. At the same time, these environmental changes can negatively impact delicately balanced ecosystems,[16] Arctic communities,[17] and can make terrestrial exploration and

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[15] The White House, National Strategy for the Arctic Region, at 5 (May 2013), *at* http://www.whitehouse.gov/sites/default/files/docs/nat_arctic_strategy.pdf.

[16] *See*, *e.g.*, *Balmy Temperatures Raise Concerns for Caribou Herd*, The Arctic Sounder (Nov. 21, 2014) (describing how thawing and refreezing can make food sources inaccessible to caribou herds, risking starvation and excessive predation), *at* http://www.thearcticsounder.com/article/1447balmy_temperatures_raise_concerns_for_caribou; Conservation of Arctic Flora and Fauna Working Group, *Life Linked to Ice – A Guide to Sea-ice-associated Biodiversity in This Time of Rapid Change*, at 1-61 (Oct. 2013) (describing climate impacts on various species) (*Life Linked to*

development activity more difficult, such as by shortening the winter operational season during which such activity usually occurs because the tundra is frozen and snow covered.

Particularly in light of the challenges posed by these changes, GCI appreciates that NTIA is working in an open and collaborative way with all stakeholders to develop a proactive Arctic strategy to "[d]evelop a framework that lists and prioritizes opportunities for investment in telecom capacity and capability, with a strong emphasis on innovative technologies with Federal, State, and international public-private partnerships by the end of 2015" and "[i]n collaboration with the Arctic Council, evaluate feasibility of an Arctic-wide telecommunications network and radio frequency spectrum management with the goals of compatible interference-free operations and Arctic-wide communications by end of the U.S. Chairmanship of the Arctic Council."[18]

With our more than 30 years of experience deploying sustainable infrastructure in the Arctic, GCI has a deep understanding that coordination and realistic planning are keys to sustainable growth in the Arctic.[19] We are eager to work with NTIA and other stakeholders to advance U.S. interests as set forth in the National Strategy for the Arctic Region as NTIA's process moves forward. At this stage, GCI offers for your consideration several important principles that we believe should guide NTIA's evaluation of the record in this proceeding.

- *Economic development will lead to additional investment in telecommunications infrastructure*. Economically stable anchor tenants – customers of broadband services – are necessary to support the considerable investment in and ongoing costs of operating broadband infrastructure throughout rural Alaska.[20] NTIA's support of policies that foster economic development generally can create the economic conditions required for further investments in telecommunications infrastructure.[21]

Ice), *at* http://www.caff.is/publications/doc_download/254-life-linked-to-ice-a-guide-to-sea-ice-associated-biodiversity-in-this-time-of-rapid-change.

[17] *See*, *e.g.*, *Life Linked to Ice*, at 62-69 (describing climate impacts on people living in the Arctic); Larry D. Hinzman *et al*., *Evidence and Implications of Recent Climate Change in Northern Alaska and Other Arctic Regions*, 72 Climatic Change, at 280-85 (2005) (describing human impacts of climate change), *at* http://www.environmentportal.in/files/file/climate%20change%20Arctic.pdf (last visited Nov. 26, 2014).

[18] *See* NOI at 59747 (quoting *Implementation Plan for the National Strategy for the Arctic Region*, The White House, at 6-7 (Jan. 2014), *at* http://www.whitehouse.gov/sites/default/files/docs/implementation_plan_for_the_national_strategy_for_the_arctic_region_-_fi....pdf.

[19] In this regard, GCI has strong working relationships with the other stakeholders in the region including Alaska Native communities and institutions, the State of Alaska, the Alaska Arctic Policy Commission, The Alaska Broadband Task Force, anchor tenants, and the Federal Communications Commission.

[20] *See Broadband Task Force Report*, *supra* note 12 (stating that "[c]ollective anchor tenant demand is necessary to spur infrastructure investment and to provide ongoing support to completed projects.

[21] Today, school districts and rural health care providers are the primary anchor tenants for rural broadband services; additional anchor tenants would reliably make more investments attractive.

- *Existing communications technologies in the Arctic are not a barrier to economic growth*. As explained above, improvements in satellite technology make the delivery of advanced communications services to Arctic businesses technically feasible and cost effective through smart network design and operation.[22] Because existing technologies can adequately support projected demand in the Arctic, sound public policy counsels against jeopardizing scarce societal resources on grants and loans for new high-risk telecommunications deployments premised on the faith that "if we build it they will come."[23] Investment in "gold-standard" telecommunications infrastructure will be appropriate when projected demand exceeds the capacities of existing networks.

- *Promote sound, sustainable investments*. NTIA policies should ensure that partners in Arctic development have the experience, competency, and resources necessary to successfully complete and operate projects. A rational, economically sustainable business plan is critical to lasting infrastructure projects, so that communities and other participants can trust that the investments will lead to positive outcomes. Moreover, any public funding for projects should not interfere with basic market forces, strand private investment, duplicate existing government-supported projects, or create unsustainable "white elephants." Establishing policies that ensure project owners must have familiarity with the environment, a substantial stake in the venture, and a sustainable business plan is necessary for all stakeholders to benefit from lasting infrastructure investments.

- *Promote competition to use limited resources efficiently*. Markets and opportunities must be available to all qualified participants. In the telecommunications arena, advancements and innovations have occurred when service providers push each other to improve. An open market has provided the best solutions to many of Alaska's service challenges; broadband access in Alaska's Arctic is no different. Any available funding must be subject to competitive bid to ensure the positive effects of competition – highest quality in the most cost-effective manner – can be preserved in rural Alaska, even when public funding is provided.[24]

- *Remove project barriers by streamlining permitting requirements and ensuring predictable timelines*. NTIA should work with the state and federal government to streamline the permitting process for infrastructure projects on public lands, consistent with the vision of the Executive Order No. 13616, *Accelerating Broadband Infrastructure Deployment*, and the work of the interagency Broadband Deployment on Federal Property Working Group.[25] Industry frequently encounters costly and time-

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[22] *See supra* page 5.

[23] *See Broadband Task Force Report*, at 28 (stating that in some regions of Alaska, broadband delivered by satellite is the only practical alternative); *id*. at 9 (including as a guiding principle that satellite solutions should be included in any final design).

[24] *See Broadband Task Force Report*, at 10 (setting forth implementation practices).

[25] *See* Exec. Order 13616, *Accelerating Broadband Infrastructure Deployment*, 77 Fed. Reg. 36903 (June 12, 2012), *at* http://www.gpo.gov/fdsys/pkg/FR-2012-06-20/pdf/2012-15183.pdf; *see also* Broadband Deployment on Federal Property Working Group, *Implementing Executive Order 13616:*

consuming redundancy in state and federal permitting, raising costs, creating unpredictability, and discouraging investment. Predictable permitting processes could clear otherwise immovable obstacles to deployment and shorten timelines, while maintaining a fair, fact-based review process.

- *Extend benefits beyond primary population centers*. NTIA should promote policies that extend the benefits of communications networks beyond anchor tenants, to ensure the smaller business and residents in the same communities are also served by new investment in communications infrastructure.[26] This will help ensure that all residents, businesses, and other institutions in the Arctic share in the benefits of societal investment.

V. Conclusion

GCI's commitment to the Arctic, and Alaska, speaks for itself. With more than three decades of unsurpassed telecommunications experience in the State, no company is more engaged with or committed to the Arctic. We have proven skill and experience serving this unique region, we set – and, importantly, met – aggressive deployment goals throughout rural Alaska, and we continue our unparalleled tradition of innovation and investment. We look forward to working with NTIA to bring sustainable economic development to the Arctic through communications infrastructure.

Respectfully submitted,

/s/
Tina Pidgeon
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/s/
Tim Stelzig
Federal Regulatory Attorney

December 4, 2014

Progress on Accelerating Broadband Infrastructure Deployment (Aug. 2013), *at* http://www.whitehouse.gov/sites/default/files/microsites/ostp/broadband_eo_implementation.pdf.

[26] *Broadband Task Force Report* at 10.

Attachment 1
Arctic Boundary as Defined by the Arctic Research and Policy Act (ARPA)